

Mammal survey of Seven Mile Beach National Park and Comerong Island Nature Reserve on the south coast of New South Wales

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ABSTRACT

A survey of the mammal fauna in the coastal forests and adjacent farmland in the Seven Mile Beach/Comerong Island area, near Nowra on the New South Wales south coast, recorded 22 native and 7 introduced species. Insectivorous bats (10 species) comprised 45% of the native species recorded. Previous records and reports of a further nine native and one introduced species are documented, including several which are now extinct in the area. Conservation of the surviving native mammal fauna is dependent on the protection and management of the remaining remnants of the original vegetation.

Key words: Mammal survey, Seven Mile Beach, Comerong Island, Open forest, Littoral rainforest, Remnant vegetation.

INTRODUCTION

Seven Mile Beach and Comerong Island are located on the New South Wales south coast, 10 km east of Nowra and about 120 km south of Sydney. Most of the area has been cleared for agriculture since European settlement in 1822 and is currently used for dairy farming. Two small reserves, Seven Mile Beach National Park, dedicated in 1971, and Comerong Island Nature Reserve, dedicated in 1986, form a narrow isolated strip of coastal forest, separated by the Shoalhaven River. Small hilltop forest remnants also remain nearby on Mount Coolangatta and Moeyan Hill. The closest large area of native forest is on the Illawarra escarpment 10 km to the north-west.

The present study was undertaken to provide information to assist in the management of the national park and nature reserve. Its aim was to collect information on the existing mammal fauna in the area and to summarize information on the species which formerly occurred there.

STUDY AREA

The study area (Fig. 1) comprised Seven Mile Beach National Park, Comerong Island Nature Reserve and the adjacent farmland. Moeyan Hill was included as an example of one of the hilltop forest remnants (chosen by reason of ease of access).

At 898 ha, Seven Mile Beach National Park is one of the state's smallest national parks. It consists largely of open forest dominated by Bangalay *Eucalyptus botryoides* and Black-

butt *Eucalyptus pilularis*, with a narrow band of Coastal Teatree *Leptospermum laevigatum* scrub along the beachfront. Small areas of littoral rainforest, dominated by Cheesetree *Glochidion ferdinandi*, occur in the north of the Park. Seven Mile Beach is backed by Coomonderry Swamp, an extensive freshwater reedland with a narrow band of Swamp Mahogany *Eucalyptus robusta* swamp woodland on the eastern margin.

The 660 ha Comerong Island Nature Reserve comprises about 300 ha of terrestrial habitats and the balance is estuarine. It has *E. botryoides* — *E. pilularis* open forest and *L. laevigatum* scrub similar to that found at Seven Mile Beach National Park. It also has a large, floristically diverse, area of littoral rainforest, and areas of Grey Mangrove *Avicennia marina* woodland.

Moeyan Hill rises 163 m above the coastal plain, and has about 185 ha of open forest dominated by Forest Red Gum *Eucalyptus tereticornis*, Turpentine *Syncarpia glomulifera*, Rough-barked Apple *Angophora floribunda*, and Thin-leaved Stringybark *Eucalyptus eugenioides*. Linear patches of subtropical rainforest occur in sheltered gullies. Most of the forest is on freehold land, with the exception of a 37 ha public reserve.

METHODS

The survey was undertaken between January 1994 and December 1995. Survey methods consisted of trapping, spotlighting, chance encounters, identification of indirect signs, and electronic recording of insectivorous bat vocalizations.

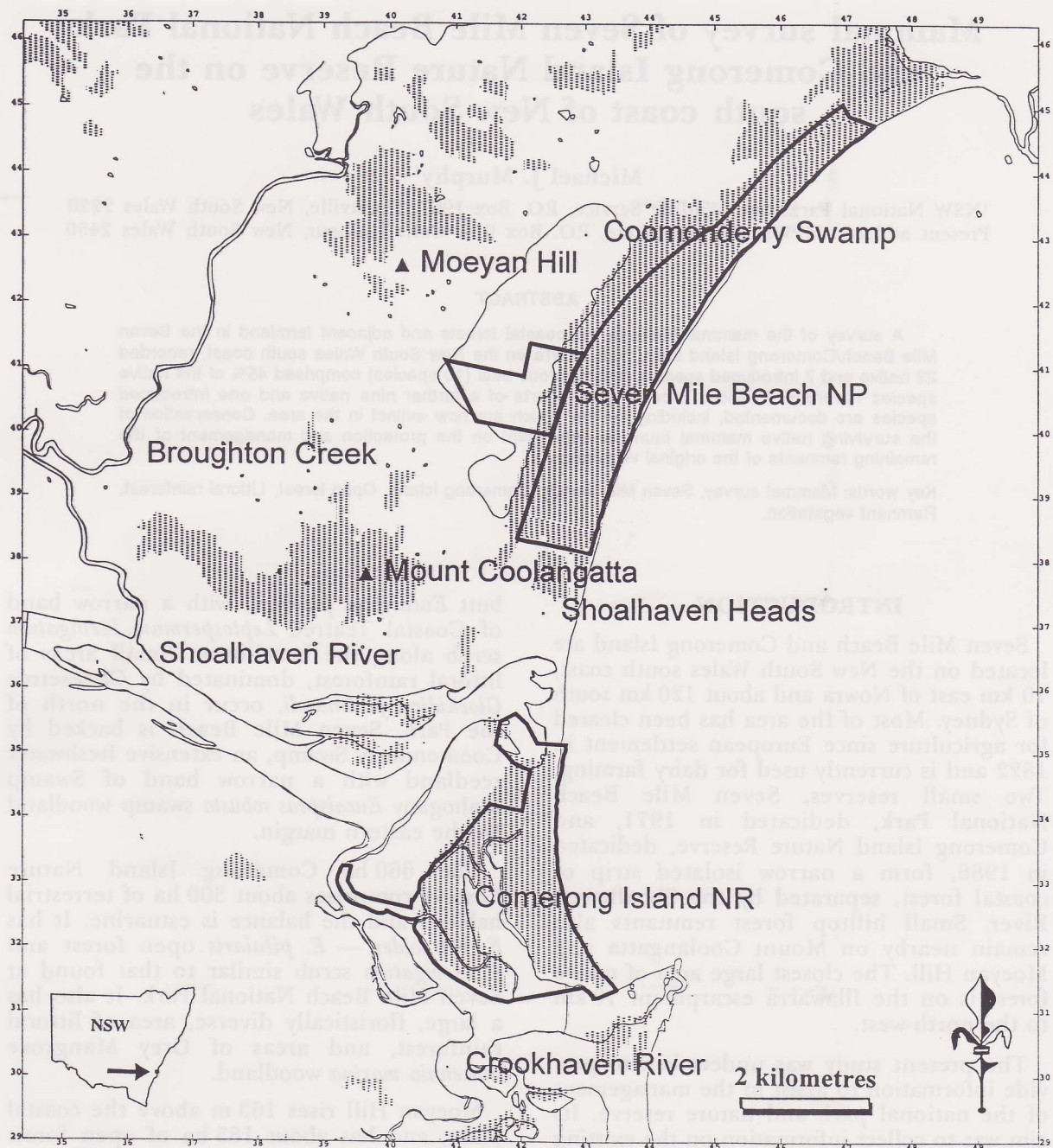


Figure 1. The study area showing the location of Seven Mile Beach National Park, Comerong Island Nature Reserve and hilltop forest remnants at Moeyan Hill and Mount Coolangatta. The shaded areas show the remaining remnants of the original forest cover.

1. Trapping. (i) Aluminium Type A Elliott traps baited with a peanut butter/rolled oats mixture were set in trap-lines of five to twelve traps set for between one and four nights, for a total of 810 trap-nights, to catch small to medium-sized ground-dwelling species. (ii) Aluminium Type B Elliott traps baited with sardine were set in pairs along creeks and shorelines for a total of 30 trap-nights to catch the aquatic Water Rat *Hydromys chrysogaster*. (iii) Wire cage traps (60 × 20 × 20 cm) baited with fresh meat were set for 12 trap-nights to catch medium-sized species.
2. Spotlighting for arboreal species, using a 50 watt handheld spotlight, was done along walking tracks and roads on transects ranging from 200 m to 4 km. It was undertaken between dusk and 0100 in sessions averaging two to three hours, and totalled 86 hours.
3. Indirect signs noted included tracks, foraging signs, scats, nests, skeletal remains,

and vocalizations. A total of 29 scats were collected and their hair content was analysed. Analyses were carried out by Barbara Triggs (Genoa, Victoria).

4. Chance encounters included diurnal records of live animals, as well as animals found dead on roads.
5. The recording and analysis of bat ultrasonic vocalizations was provided by Roger Coles (University of Queensland). An electronic bat detector (Ultra Sound Advice model S-25 with Sony Walkman WM-6DC cassette recorder) was used to record ultrasonic echolocation calls at four sites in Seven Mile Beach National Park.
6. Status. Each species recorded was assigned a status using the three categories defined by Lunney and Barker (1986): common (frequently recorded over a wide area), uncommon (infrequently recorded, although possibly common in small areas) or rare (very infrequently recorded and never abundant in any area). The status ranking does not include the insectivorous bats.
7. Previous records. A literature review, an examination of specimen records in the Australian Museum and CSIRO Australian

National Wildlife Collection, and interviews with local residents were undertaken to identify additional species previously known in the study area.

RESULTS

Twenty-two native and seven introduced species (excluding the domestic stock *Bos taurus* and *Equus caballus*) were recorded during the survey. Over 260 records were provided to the NSW National Parks and Wildlife Service Atlas of New South Wales Wildlife database.

Table 1 provides a summary of the 12 native and 7 introduced species recorded by trapping, spotlighting, chance encounters, and indirect signs. The greatest number of native mammal species was recorded at Seven Mile Beach National Park (10 species), followed by Moeyan Hill (eight species), Comerong Island Nature Reserve (six species), and farmland (four species). The greatest number of introduced mammal species was recorded in farmland (six species), followed by Seven Mile Beach National Park and Comerong Island Nature Reserve (both five species), and Moeyan Hill (four species).

Table 1: Species recorded by trapping, spotlighting, chance encounters and indirect signs. Key: Method of detection: T = trapping, S = spotlighting, D = diurnal encounter, R = roadkill, P = prey in fox or dog scat, I = other indirect signs. Location and Habitat: 7MB = Seven Mile Beach NP, Com Is = Comerong Island NR, O = open forest, R = littoral rainforest, T = teatree scrub, S = swamp reedland, M = mangrove woodland, F = open farmland, MH = Moeyan Hill. Status: C = common, U = uncommon, R = rare.

	Method						7MB				Com Is							
	T	S	D	R	P	I	O	R	T	S	O	R	T	M	F	MH	Status	
Native species																		
<i>Tachyglossus aculeatus</i>		+	+	+	+		+	+			+	+					U	
<i>Antechinus stuartii</i>	+	+	+				+	+								+	C	
<i>Perameles nasuta</i>	+			+	+	+	+	+			+		+			+	U	
<i>Petaurus breviceps</i>		+			+	+	+	+								+	C	
<i>Petauroides volans</i>		+					+										C	
<i>Pseudocheirus peregrinus</i>		+		+	+	+	+	+	+		+	+	+			+	C	
<i>Trichosurus vulpecula</i>		+		+	+	+	+								+	+	C	
<i>Macropus rufogriseus</i> ¹						+										+	R	
<i>Wallabia bicolor</i>		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	C	
<i>Pteropus poliocephalus</i>		+	+			+	+	+			+	+			+		C	
<i>Hydromys chrysogaster</i>				+											+		R	
<i>Rattus fuscipes</i>	+				+	+	+	+			+	+				+	C	
Subtotal	3	8	4	6	7	8	10	8	2	1	6	5	3	1	4	8		
Introduced species																		
<i>Mus musculus</i>	+						+	+									R	
<i>Rattus norvegicus</i> ²				+	+								+		+		R	
<i>Rattus rattus</i>	+	+	+	+	+	+	+	+	+		+	+	+		+	+	C	
<i>Canis familiaris</i>			+			+	+		+		+		+		+	+	C	
<i>Vulpes vulpes</i>		+	+	+		+	+				+	+	+		+	+	C	
<i>Felis catus</i>		+					+	+							+		U	
<i>Oryctolagus cuniculus</i>		+	+	+	+	+							+		+	+	U	
Subtotal	2	4	4	4	3	4	5	3	2	0	3	2	5	0	6	4		
Total	5	12	8	10	10	12	15	11	4	1	9	7	8	1	10	12		

¹Identified from hair in macropod scat from Moeyan Hill as definite *Macropus* sp., probably *M. rufogriseus*.

²Identified from hair in fox scat from Comerong Island as definite *Rattus* sp., probably *R. norvegicus*. Roadkill specimen collected in farmland bordering Shoalhaven River lodged in Australian Museum (AM specimen M31927).



Figure 2. The Brown Antechinus *Antechinus stuartii* was common in open forest at Seven Mile Beach National Park, with up to 100% capture on some trap-lines. It was also recorded at Moeyan Hill, but has apparently become extinct on Comerong Island. Photograph by Sue Murphy.



Figure 3. Tracks of the Long-nosed Bandicoot *Perameles nasula* at Comerong Island Nature Reserve. Only a single individual of this trap-shy species was captured during the study. Most records were from indirect signs, including tracks and diggings. Photograph by Michael Murphy.



Figure 4. The Sugar Glider *Petaurus breviceps* was frequently observed while spotlighting at night in forest at Seven Mile Beach National Park and Moeyan Hill, particularly in wattles *Acacia* spp. This small gliding possum was also recorded by its distinctive yapping call, similar to the sound of a small dog. Photograph by Michael Murphy.

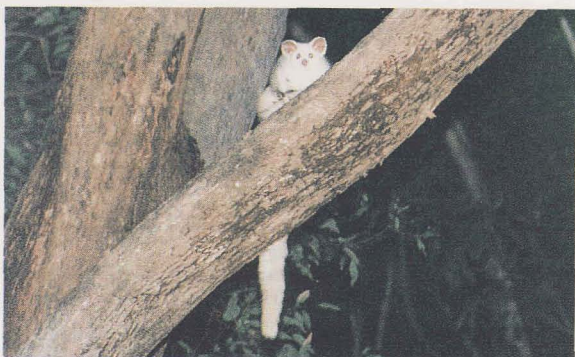


Figure 5. The open forest at Seven Mile Beach National Park, with abundant hollow-bearing trees, supported a large population of the Greater Glider *Petauroides volans*, as well as the predatory Powerful Owl *Ninox strenua*. Photograph by Michael Murphy.



Figure 6. The Common Ringtail Possum *Pseudocheirus pterogrinus* was abundant in the dense, low canopy of the littoral rainforest at Comerong Island Nature Reserve. This was the only species of possum recorded on the Island. Photograph by Michael Murphy.



Figure 7. The Common Brushtail Possum *Trichosurus vulpecula*, shown here with young at Seven Mile Beach National Park, was also occasionally recorded in roadside vegetation in farmland. Photograph by Michael Murphy.



Figure 8. The Swamp Wallaby *Wallabia bicolor*, shown here feeding on the road verge in Seven Mile Beach National Park, was the only common macropod in the study area. Photograph by Michael Murphy.



Figure 9. This Bush Rat *Rattus fuscipes* was caught in an Elliott trap at Seven Mile Beach National Park. Isolated populations of this native species in the study area may be threatened by competition with the introduced Black Rat *Rattus rattus*. Photograph by Michael Murphy.

The status of each species in the study area shows that eight native species were common, two were uncommon, and two were rare, and that three introduced species were common, two were uncommon, and two were rare. The most common species at Seven Mile Beach National Park were *Antechinus stuartii* and *Petaurides volans*, at Comerong Island Nature Reserve, *Pseudocheirus peregrinus* and *Pteropus poliocephalus*, at Moeyan Hill, *Oryctolagus cuniculus* and *Petaurus breviceps*, and in farmland, *Vulpes vulpes* and *Rattus rattus*. A maternity camp of several thousand *Pteropus poliocephalus* occupied a site in littoral rainforest on Comerong Island between October and April.

Ten insectivorous bat species were recorded at Seven Mile Beach National Park (Table 2). Five to six species were recorded at each of the three sites in open forest, while only a single species was recorded in littoral rainforest. Two species are listed as vulnerable in the New South Wales *Threatened Species Conservation Act 1995*.

Table 2: Insectivorous bats recorded at Seven Mile Beach National Park. Sites A–C (open forest) visited on 28.02.95. Site D (littoral rainforest) visited on 01.03.95. Each site sampled for 15 minutes. Numbers refer to number of passes recorded.

Species	Site			
	A	B	C	D
<i>Saccolaimus flaviventris</i> ¹	1	—	—	—
<i>Mormopterus</i> sp. 1 ²	3	—	—	—
<i>Nyctinomus australis</i>	—	1	—	—
<i>Nyctophilus</i> sp. ³	—	—	1	—
<i>Chalinolobus gouldii</i>	—	2	1	—
<i>Scoteanax rueppellii</i> ¹	—	4	—	—
<i>Vespadelus darlingtoni</i>	2	1	2	—
<i>Vespadelus pumilus</i>	10	3	6+	17+
<i>Vespadelus regulus</i>	3	1	2	—
<i>Vespadelus vulturinus</i>	—	—	2	—
Number of Species	5	6	6	1

¹Vulnerable species listed in New South Wales *Threatened Species Conservation Act 1995*.

²Undescribed species (Parnaby 1992).

³Unable to be reliably identified to species level. Either *N. geoffroyi* or *N. gouldi*.

Records of ten additional species (nine native and one introduced species) obtained from secondary sources are summarized in Table 3. Four of these are considered to be extinct in the study area, while the remaining six may still occur there, at least occasionally. One species is listed as endangered and three species listed as vulnerable in the New South Wales *Threatened Species Conservation Act 1995*. Of these, only one vulnerable species is considered likely to be extant in the study area.

Table 3: Additional species recorded from secondary Sources. Key: Source: A = anecdotal report from local resident, M = Museum specimen, R1 = Robinson (1985), R2 = Robinson (1988). Current status in study area: E = presumed locally extinct, P = population possibly extant, V = may still occur as vagrant individuals. Note: information concerning current status is speculative only.

Species	Source	Current Status?
Native species		
<i>Dasyurus maculatus</i> ¹	R2, A	V
<i>Dasyurus viverrinus</i> ²	R2	E
<i>Phascogale cinereus</i> ¹	R2	E
<i>Vombatus ursinus</i>	A	P
<i>Cercartetus nanus</i>	R2	P
<i>Acrobates pygmaeus</i> ³	M, R2	P
<i>Potorous tridactylus</i> ¹	A	E
<i>Thylogale thetis</i>	R2	E
<i>Pteropus scapulatus</i>	R1	V
Introduced species		
<i>Lepus capensis</i>	A	P

¹Vulnerable species listed in New South Wales *Threatened Species Conservation Act 1995*.

²Endangered species listed in New South Wales *Threatened Species Conservation Act 1995*.

³Australian Museum specimen M11174 collected in open forest in Seven Mile Beach NP in 1978.

DISCUSSION

Native Species

The most significant finding of this study was the richness of the bat fauna. The ten species of insectivorous bats accounted for 45% of the native mammal species recorded. This included two species, *Saccolaimus flaviventris* and *Scoteanax rueppellii*, listed as vulnerable in the New South Wales *Threatened Species Conservation Act 1995*. The record of *S. flaviventris* was the first on the Illawarra coastal plain for over 30 years (Robinson 1985). The survey effort for insectivorous bats in this study was not extensive, and it is considered likely that additional species occur in the area.

The camp of *Pteropus poliocephalus* on Comerong Island is one of the most southerly annual breeding camps of this species in New South Wales. The southern limit of breeding camps has been reported as Nowra, 10 km west of Comerong Island (Hall and Richards 1979), Lake Conjola, 45 km south (Robinson 1985), and Jervis Bay, 30 km south (Eby 1995). The breeding range of *P. poliocephalus* contracted northward following the destruction of camps on the New South Wales far south coast earlier this century (Lunney and Leary 1988).

Five native species recorded from secondary sources in this study are considered to possibly be extant in the study area. *Dasyurus maculatus* was reported by local resident

B. Bishop (1994, pers. comm.) as common in the area, and a frequent predator of poultry, until the 1960s. The most recent reliable record from the study area was a road-killed animal south of Seven Mile Beach National Park in July 1987 (Robinson 1988). Additional anecdotal reports from local residents from the mid 1980s, 1992 and 1993–94 (E. Hollinger 1995; B. Whiteoak 1994; S. Knox 1995, pers. comm.) were obtained during the present study. *D. maculatus* may still occur in the study area as a rare resident or vagrant.

A single anecdotal report of *Vombatus ursinus* from forested Crown Land between Seven Mile Beach National Park and Shoalhaven Heads in 1990–91 was obtained from local resident L. Dellou (1994, pers. comm.). A specific search of the area during the present survey yielded no sign of the species. However, given the relatively recent date of the reputed sighting, and the difficulty in confusing *V. ursinus* with any other likely species, it is considered possible that a small, isolated population may still occur in the area.

A specimen of *Acrobates pygmaeus* in the Australian Museum was collected in Seven Mile Beach National Park in 1978, and *A. pygmaeus* and *Cercoptes nanus* were recorded in Seven Mile Beach National Park by Robinson (1988). These two small, cryptic species are difficult to detect during fauna surveys. Suitable potential habitat still exists in Seven Mile Beach National Park, and it is expected that both species may persist there.

Robinson (1985) documented an anecdotal report of *Pteropus scapulatus* from a farmer on Comerong Island. This nomadic species sometimes joins camps of other species of *Pteropus* (Hall and Richards 1979), and it is possible that it may visit the *P. poliocephalus* camp on Comerong Island occasionally.

The remaining four native species recorded from secondary sources are now considered to be locally extinct. Robinson (1988), citing anecdotal historical records, reported that *Thylogale thetis* and *Dasyurus viverrinus* occurred on Comerong Island until 1900 and the 1920s respectively, and that *Phascogale cinereus* occurred at Seven Mile Beach and Coolangatta Mountain until the 1940s.

An anecdotal report of *Potorous tridactylus* from Moeyan Hill was obtained from local resident D. Grant (1995, pers. comm.). The animals reputedly occurred in a lantana-infested rainforest gully until 1983, disappearing following the clearing of lantana.

The area has since been subjected to rural residential development, and this isolated and unconfirmed population is now presumed extinct.

Of the three remnant forest areas surveyed in this study, Comerong Island Nature Reserve had the lowest recorded diversity of native mammal species. The Island has been isolated since 1822 (Robinson 1988), considerably longer than either Seven Mile Beach National Park or Moeyan Hill. This, in combination with its small size and history of disturbance by fires and logging, accounts for the lower species diversity. Native mammal species richness in forest remnants generally declines as the duration of isolation increases (Bennett 1987).

Robinson (1988) recorded three species at Comerong Island Nature Reserve which have apparently since declined to extinction. *Antechinus stuartii*, *Petaurus breviceps* and *Trichosurus vulpecula* were not recorded on Comerong Island in the present study, although they were commonly recorded elsewhere in the study area. Robinson (1988) commented that *Petaurus breviceps* was at that time rare on Comerong Island, and that several other species there could be in jeopardy in the future.

Several species now absent from areas of suitable habitat, such as *Antechinus stuartii*, *Petaurus breviceps* and *Thylogale thetis* on Comerong Island and *Phascogale cinereus* at Seven Mile Beach and Coolangatta Mountain, could be considered for future reintroduction projects. However, the exact factors causing their initial extinctions are not understood and may still be present, thus preventing their successful re-establishment. Reintroduction projects in Australia have frequently ended in failure (Short *et al.* 1992). Management of Seven Mile Beach National Park and Comerong Island Nature Reserve aims to protect the remaining native species diversity through the control of wildfire, introduced plant and animal species, and public access (NSW National Parks and Wildlife Service 1996).

Introduced species

This study provided the first records of the introduced *Rattus norvegicus* on the New South Wales coast south of Wollongong. The species may be in the process of extending its range, accompanying urban development along the coast. Alternately, a small population may have persisted in the area from the period when the Shoalhaven River was an important sea port 150 years ago.

The introduced *Rattus rattus* was recorded in this study in all three vegetation remnants surveyed, predominantly in disturbed areas along roads, around clearings, and on forest edges, as well as in the adjacent farmland. This species has completely displaced the native *Rattus fuscipes* in forest and heath on Beecroft Peninsula, 15 km south of the study area (Coyne *et al.* 1979). The three isolated populations of *R. fuscipes* in the study area could potentially be displaced in the same fashion.

Introduced predators are considered a current threat to the local native mammal species. Seven ground-dwelling and arboreal native species were recorded as prey of *Canis familiaris* and *Vulpes vulpes*. *Felis catus*, also recorded in the study area, is known to prey on a range of native species (Triggs *et al.* 1984). All three would also compete with any *D. maculatus* in the area. *F. catus* in the study area included both feral and free-ranging domestic animals, while *C. familiaris* was entirely domestic. The existence of domestic predator populations, and the need to avoid inadvertent impact on *D. maculatus*, will need to be considered in the design of any feral predator control programmes.

Oryctolagus cuniculus is not considered a major threat to native species in the coastal reserves of the study area at present. Although common in farmland and at Moeyan Hill, it was rare at Comerong Island Nature Reserve and was not recorded at Seven Mile Beach National Park. *Lepus capensis*, reported by local resident D. Grant (1995, pers. comm.) from farmland near Moeyan Hill, is expected to be an uncommon resident of farmland in the study area.

CONCLUSION

Despite the changes wrought since European settlement, the Seven Mile Beach/Comerong Island area still supports a diverse mammal fauna. Twenty-two native mammal species, and perhaps another five, still occur in the area. Most are now restricted to isolated remnants of the original vegetation. Intensification of land-use in the area coupled with increased isolation and degradation of remnant vegetation will increase pressure on the surviving fauna. The information provided in this study will provide a baseline for future assessment of changes in the area's mammal fauna.

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